

MATERIAL SAFETY DATA SHEET

SRM Supplier: National Institute of Standards and Technology
Standard Reference Materials Program
100 Bureau Drive, Stop 2321
Gaithersburg, Maryland 20899-2321

SRM Number: 154c
MSDS Number: 154c
SRM Name: Titanium Dioxide
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SECTION I. MATERIAL IDENTIFICATION

Material Name: Titanium Dioxide

Description: A unit of SRM 154c consists of 90 g of titanium dioxide as a fine powder (< 45 µm).

Other Designations: Titanium Dioxide (titanium oxide; titanium peroxide; titania; kronos; titanic oxide)

Name	Chemical Formula	CAS Registry Number
Titanium Dioxide	TiO ₂	13463-67-7

DOT Classification: Not hazardous by DOT regulations

Manufacturer/Supplier: Available from a number of suppliers

SECTION II. HAZARDOUS INGREDIENTS

Hazardous Component	Nominal Concentration (%)	Exposure Limits and Toxicity Data
Titanium Dioxide	~100	OSHA TWA (Total Dust): 15 mg/m ³
		OSHA TWA (Total Particulate): 10 mg/m ³
		ACGIH TWA: 10 mg/m ³
		Rat, Inhalation: LC ₅₀ : 6820 mg/m ³ for 4 h
		Rat, Oral: LD ₅₀ : 24000 mg/kg
		Rat, Inhalation: TC _{LO} : 250 mg/m ³ for 6 h to 4 wks

SECTION III. PHYSICAL/CHEMICAL CHARACTERISTICS

Titanium Dioxide	
Appearance and Odor: a solid colorless, white or black crystal with no odor	Melting Point: 1825 °C to 1850 °C
Relative Molecular Weight: 79.88	Vapor Pressure: negligible
Specific Gravity (Water = 1): 3.84 to 4.26	Vapor Density: negligible
Boiling Point: 2500 °C to 3000 °C	pH: neutral
Water Solubility: insoluble	Solvent Solubility: soluble in hot concentrated sulfuric acid, hydrofluoric acid, and alkali; insoluble in hydrochloric acid, nitric acid, and dilute sulfuric acid

SECTION IV. FIRE AND EXPLOSION HAZARD DATA

Flash Point: Not applicable **Method Used:** Not applicable **Autoignition Temperature:** Not applicable

Flammability Limits in Air (Volume %): **UPPER:** Not applicable
LOWER: Not applicable

Unusual Fire and Explosion Hazards: This material is a negligible fire hazard.

Extinguishing Media: Use extinguishing agents that are appropriate to the surrounding fire.

Special Fire Procedures: Fire fighters should wear self-contained breathing apparatus (SCBA) and protective clothing when fighting fires involving materials of this type.

SECTION V. REACTIVITY DATA

Stability: X **Stable** **Unstable**

Conditions to Avoid: Avoid generating dust.

Incompatibility (Materials to Avoid): Titanium dioxide is incompatible with metals. Violent reactions with incandescence can occur with titanium dioxide and the following materials: aluminum, calcium, lithium (violent reactions occur at about 200 °C; temperatures can reach 900 °C), magnesium, potassium, sodium, or zinc.

See Section IV: *Fire and Explosion Hazard Data*

Hazardous Decomposition or Byproducts: Thermal decomposition products may include toxic oxides of titanium.

Hazardous Polymerization:	Will Occur	<u>X</u>	Will Not Occur
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SECTION VI. HEALTH HAZARD DATA

Route of Entry: X **Inhalation** X **Skin** X **Ingestion**

Health Hazards (Acute and Chronic): Inhalation of titanium dioxide may cause irritation and coughing. Dust particles may cause unpleasant deposits in the nasal passages. Skin contact with this material has no toxicity and is nonirritating. With chronic exposure, there have been a few cases of slight fibrosis without disabling injury.

Signs and Symptoms of Exposure: irritation of nasal passages

Medical Conditions Generally Aggravated by Exposure: respiratory disorders

Listed as a Carcinogen/Potential Carcinogen:

	Yes	No
In the National Toxicology Program (NTP) Report on Carcinogens	<u> </u>	<u> X </u>
In the International Agency for Research on Cancer (IARC) Monographs	<u> </u>	<u> X </u>
By the Occupational Safety and Health Administration (OSHA)	<u> </u>	<u> X </u>

EMERGENCY AND FIRST AID PROCEDURES:

Skin Contact: Remove contaminated shoes and clothing. Rinse affected area with large amounts of water followed by washing the area with soap and water. Obtain medical assistance if necessary.

Eye Contact: Immediately flush eyes, including under the eyelids, with copious amounts of water for at least 15 minutes. Obtain medical assistance if necessary.

Inhalation: If inhaled, move the victim to fresh air. If breathing is difficult, give oxygen; if the victim is not breathing, give artificial respiration. Obtain medical assistance if necessary.

Ingestion: If ingestion occurs, wash out mouth with water. Obtain medical assistance if necessary.

TARGET ORGAN(S) OF ATTACK: upper respiratory tract

SECTION VII. PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be Taken in Case Material Is Released or Spilled: Notify safety personnel of major spills and/or leaks. Shut off sources of ignition. Evacuate all nonessential personnel. Avoid raising dust. Recover small spills with a clean shovel and place into a clean, dry container for later disposal. For larger spills, wet the area with water and dike the material for later disposal. Clean up remaining residue using a high efficiency particulate filter.

Waste Disposal: Follow all federal, state, and local regulations governing proper disposal.

Handling and Storage: Persons handling this material should wear an air purifying respirator with a high efficiency particulate filter. The specific respirator selected must be based on contamination levels found in the workplace, must be based on the specific operation, must **NOT** exceed the working limits of the respirator, and must be jointly approved by the National Institute for Occupational Safety and Health (NIOSH) and the Mine Safety and Health Administration (MSHA). Additional protective clothing, such as gloves, lab coats, and splash-proof or dust-resistant safety goggles should be worn.

NOTE: Contact lenses pose a special problem; soft lenses may absorb irritants and all lenses concentrate them. **DO NOT** wear contact lenses in the laboratory.

Store material in a cool, dry, well-ventilated area away from flames, sources of ignition, and incompatible materials.

SECTION VIII. SOURCE DATA/OTHER COMMENTS

Sources: MDL Information Systems, Inc., MSDS *Titanium Dioxide*, 01 December 2000.
Merck Index, 11th Ed., 1989.
The Sigma Aldrich Library of Chemical Safety Data, Ed. II, 1988.

Disclaimer: Physical and chemical data contained in this MSDS are provided only for use in assessing the hazardous nature of the material. The MSDS was prepared carefully, using current references; however, NIST does not certify the data on the MSDS. The certified value for this material is given in the NIST Certificate of Analysis.